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H04M 1/02

(52) UK CL (Edition P)

H4J JEP JK JL J30K J36Q J37X

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GB 2280322 A

GB 2264207 A

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EP 0663734 A1

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(54) **A collapsible sound conduit for mobile radio communication equipment that reduces the radiation impinging on the user**

(57) A device for a cellular telephone 10 comprising a collapsible sound conduit 30 associated with the telephone earpiece 20 that has a collapsed or non-extended state when not in use and an extended state when in use. In use the device enables the user's ear to be spaced 36 from the earpiece 20 and angled 38 with respect to the head of the user, thereby reducing the amount of radiation impinging on user's head, while nevertheless maintaining an acceptable level of hearing. The collapsible sound conduit 30 may be of various forms including a conduit with a plurality of telescoping sections (Figures 9-14), a conduit with a resilient portion that is foldable into itself (Figure 7) and a conduit including bellows (Figure 8). One embodiment (Figure 15) shows a pivotable conduit that in its collapsed state lies substantially parallel with the telephone and in its extended state, extends perpendicularly out from the telephone. The device may be integrally formed with, separate from or attached to the telephone and/or a carrying case and various arrangements for such are shown.

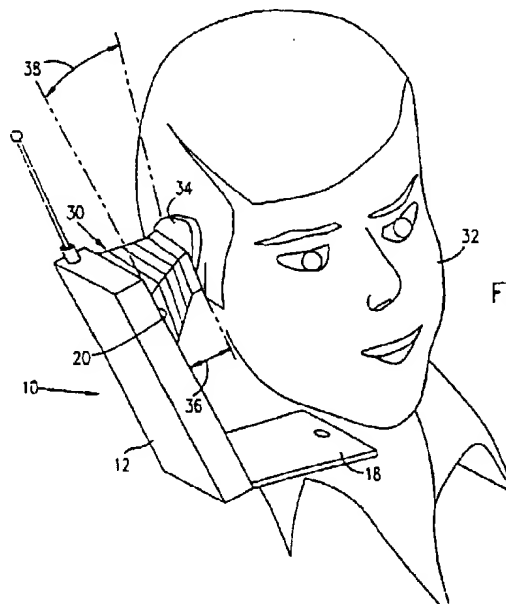


FIG. 2

GB 2 316 263 A

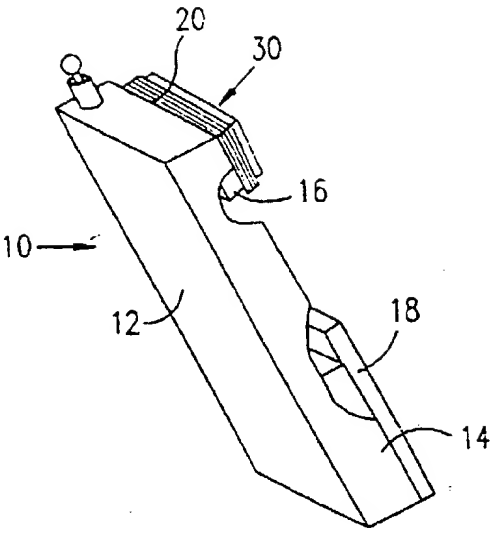


FIG. 1

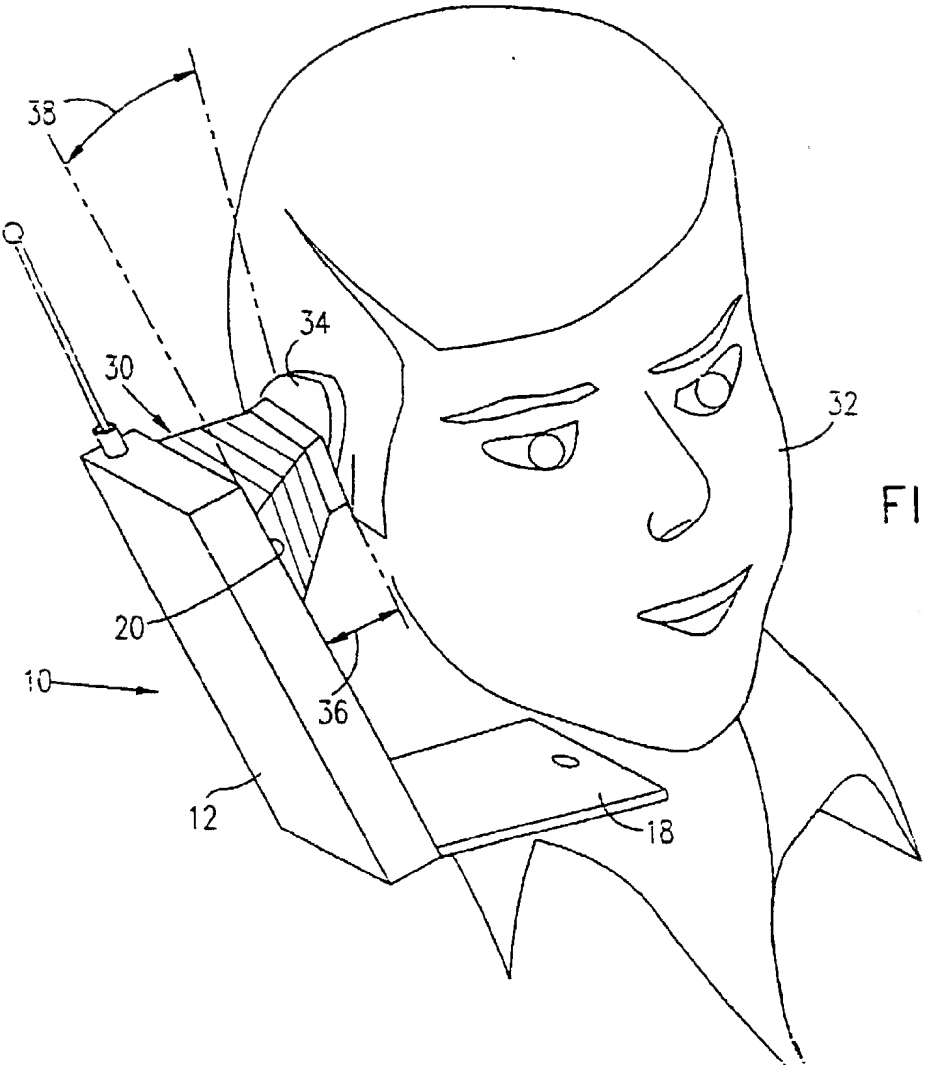


FIG. 2

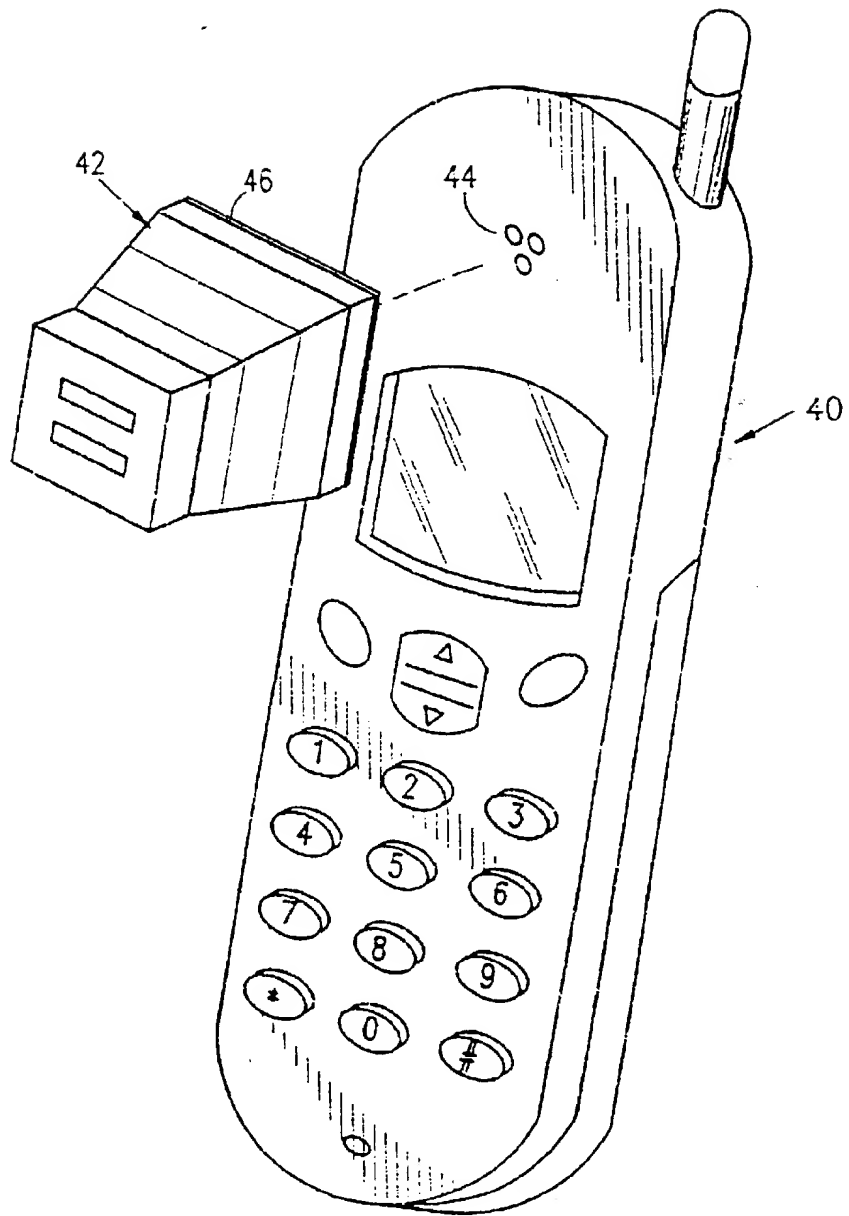


FIG. 3

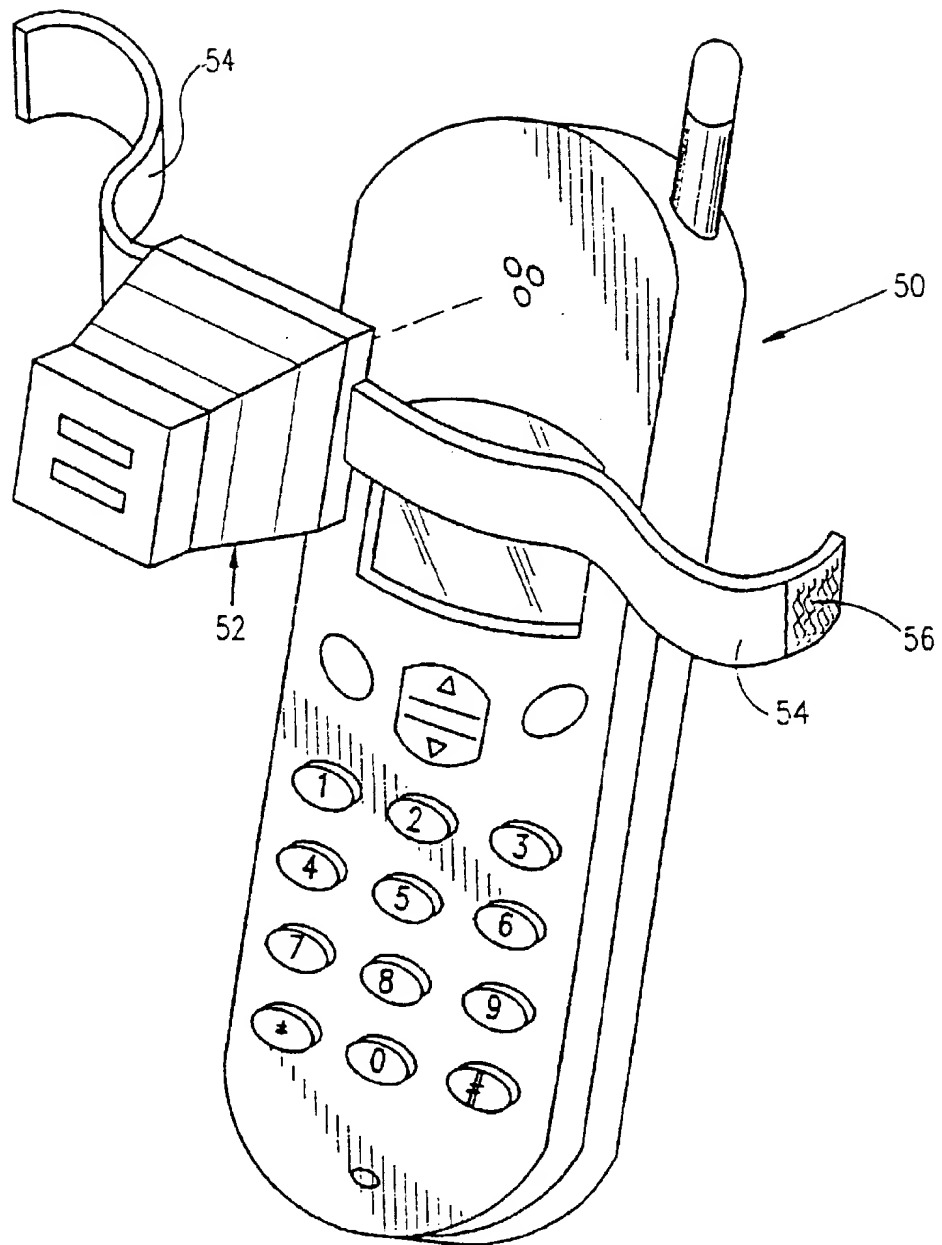


FIG. 4A

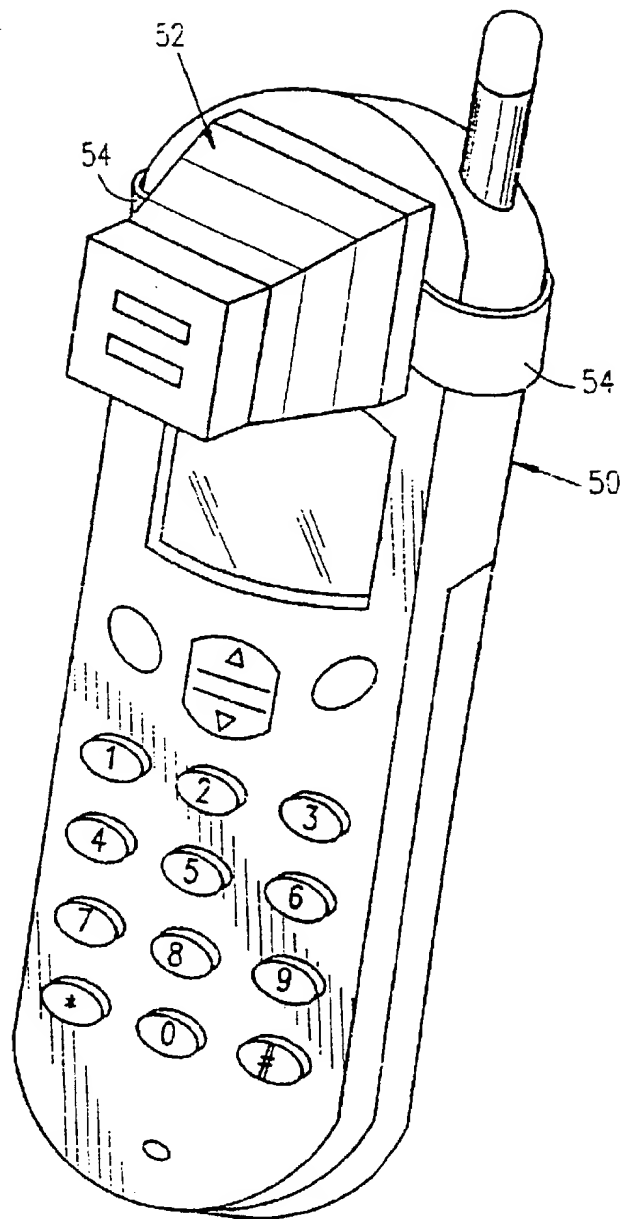


FIG. 4B

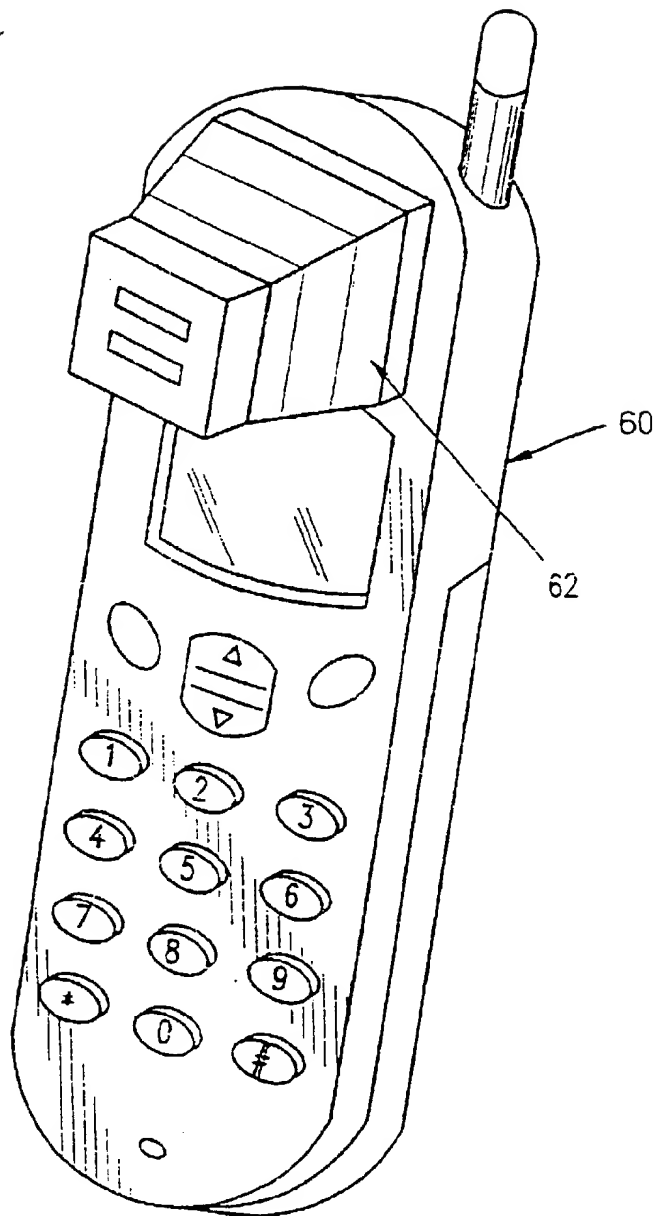


FIG. 5

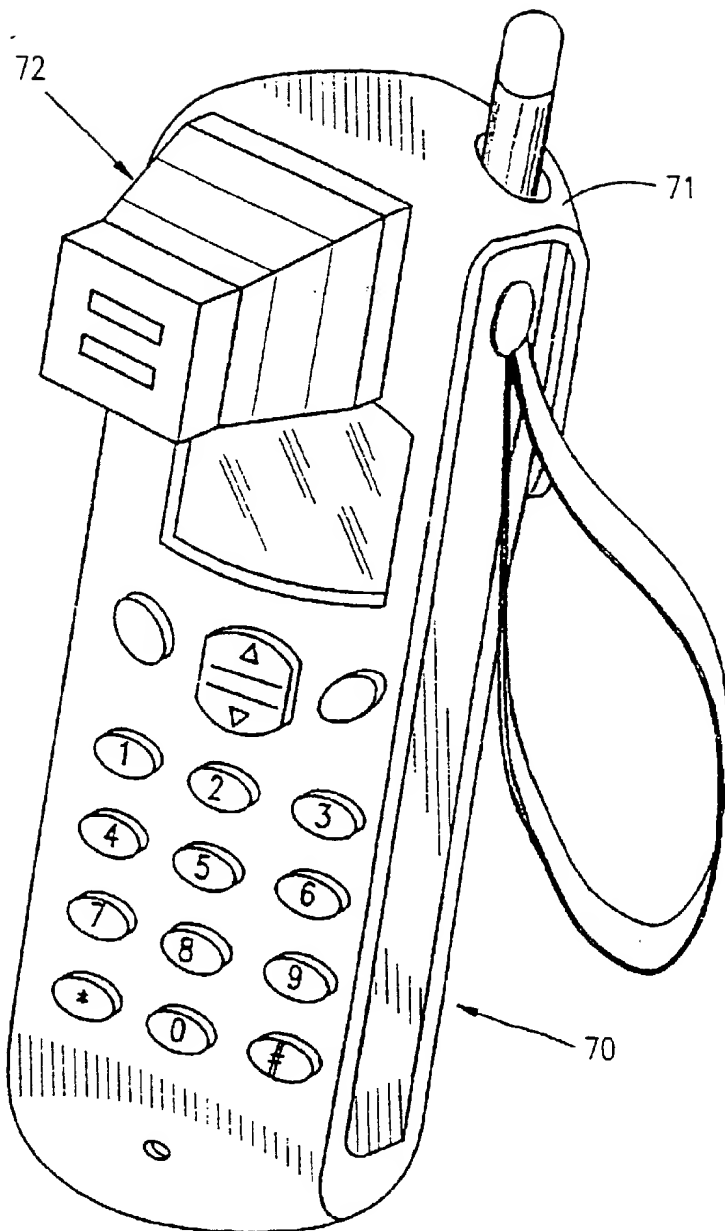


FIG. 6

FIG. 7A

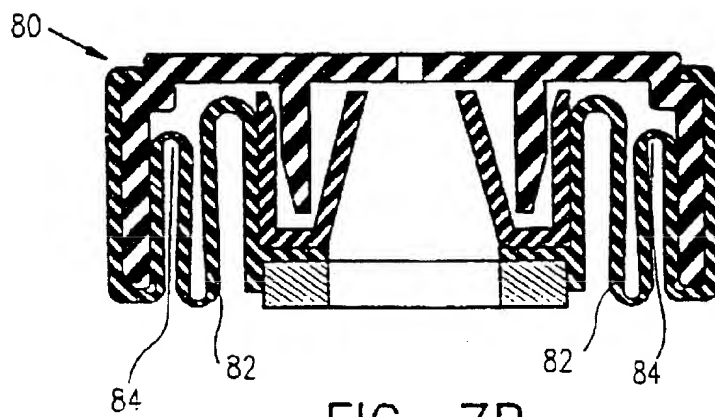
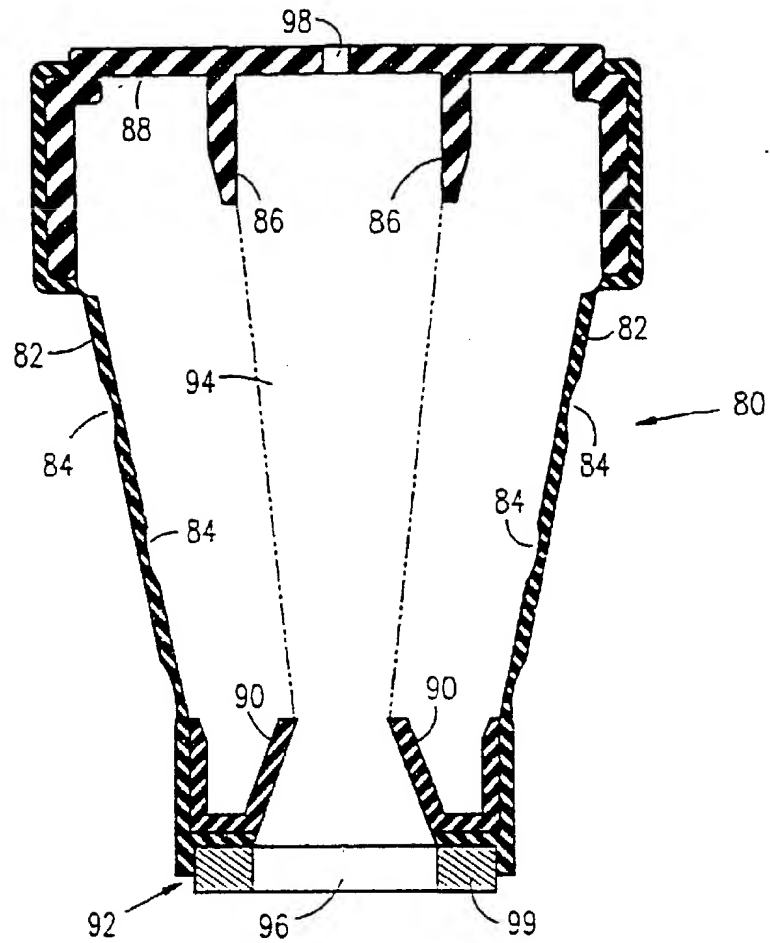


FIG. 7B

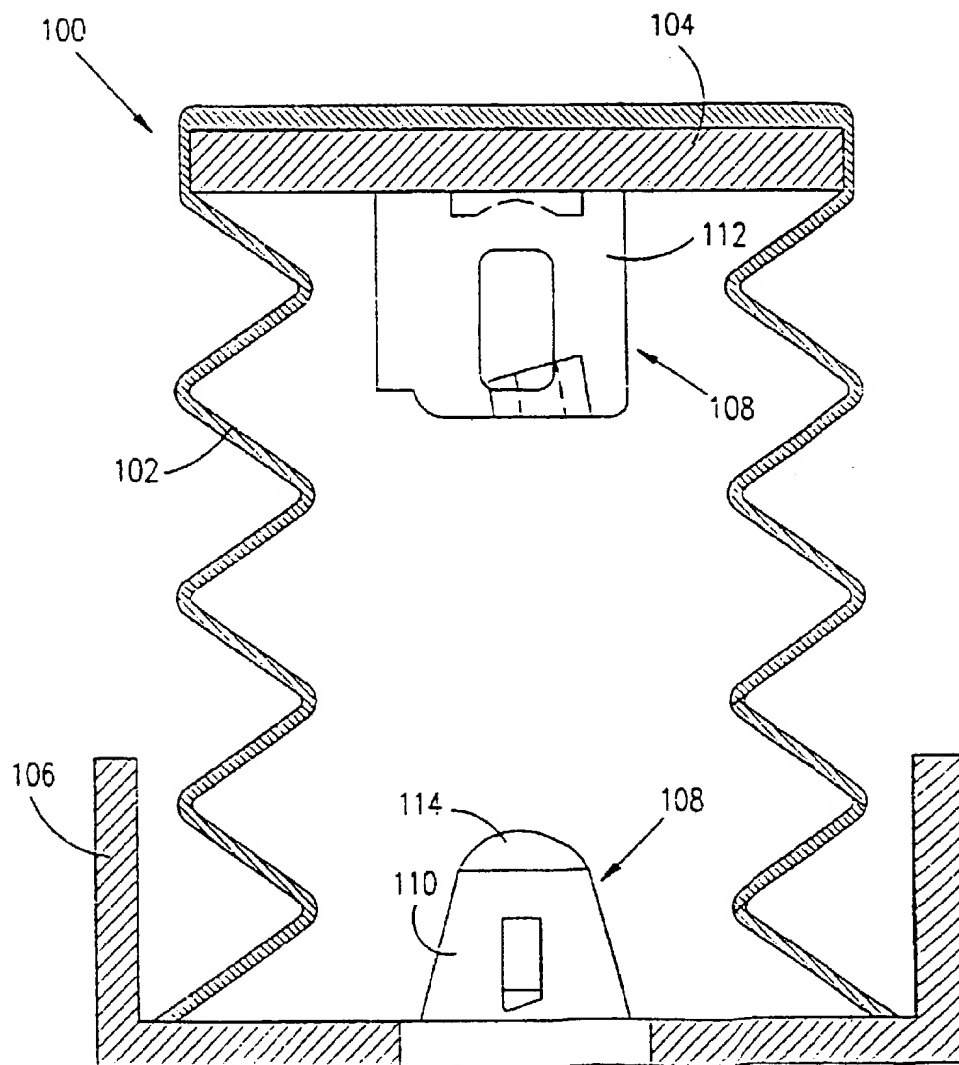


FIG. 8A

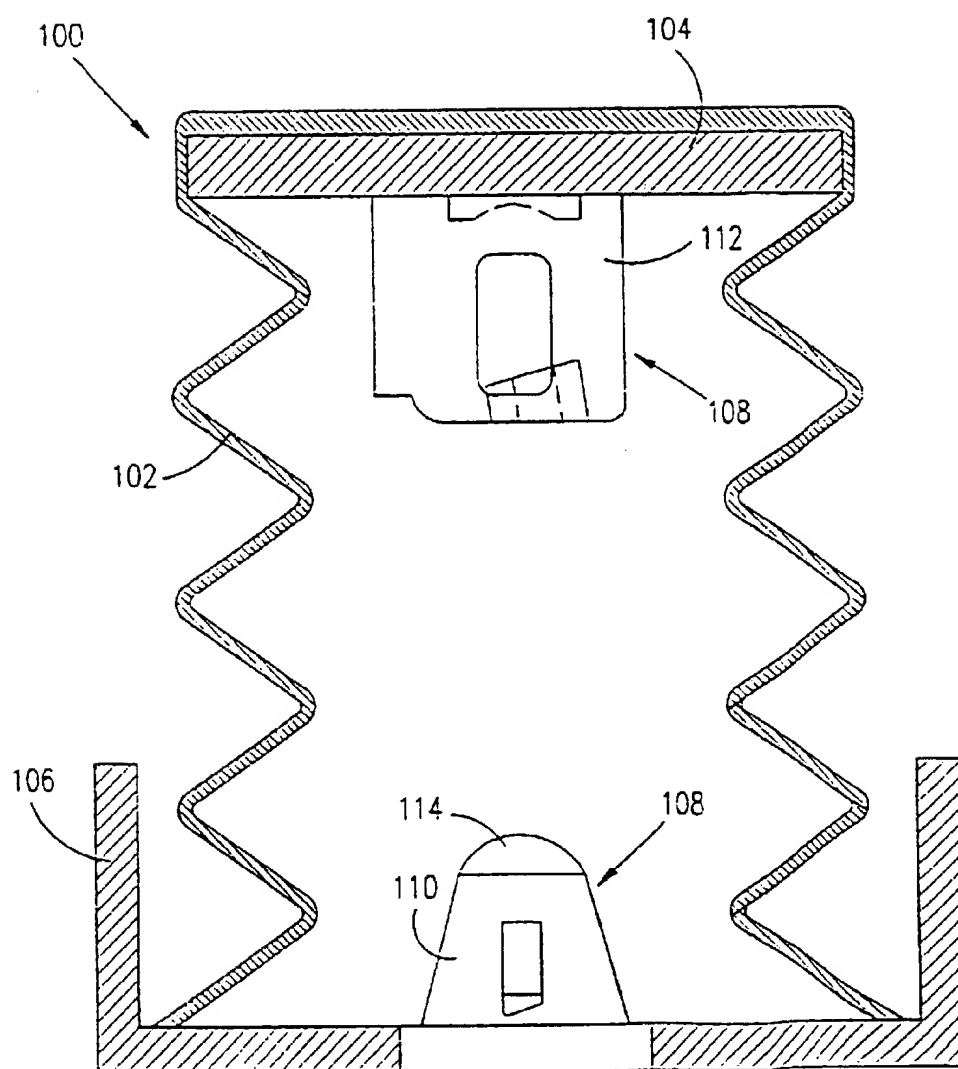


FIG. 8A

FIG. 8B

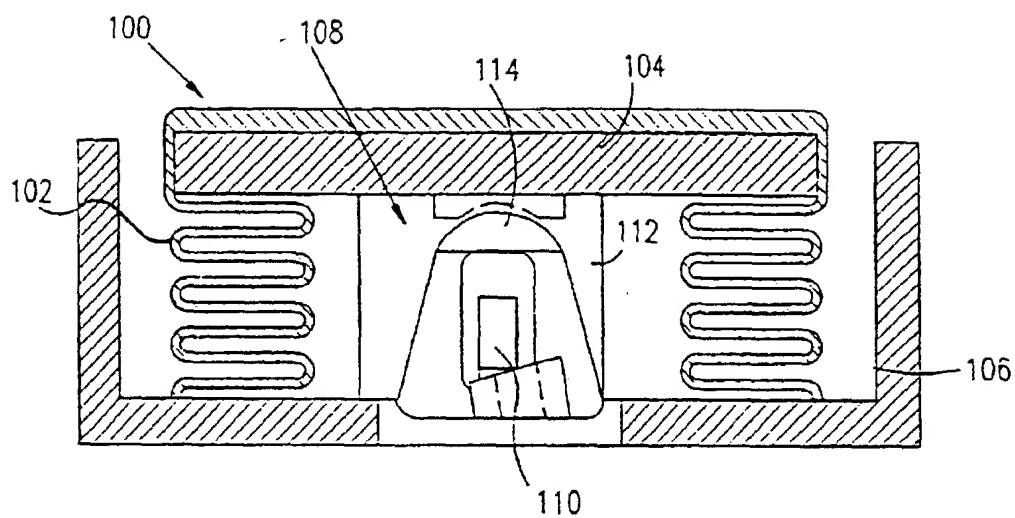


FIG. 8C

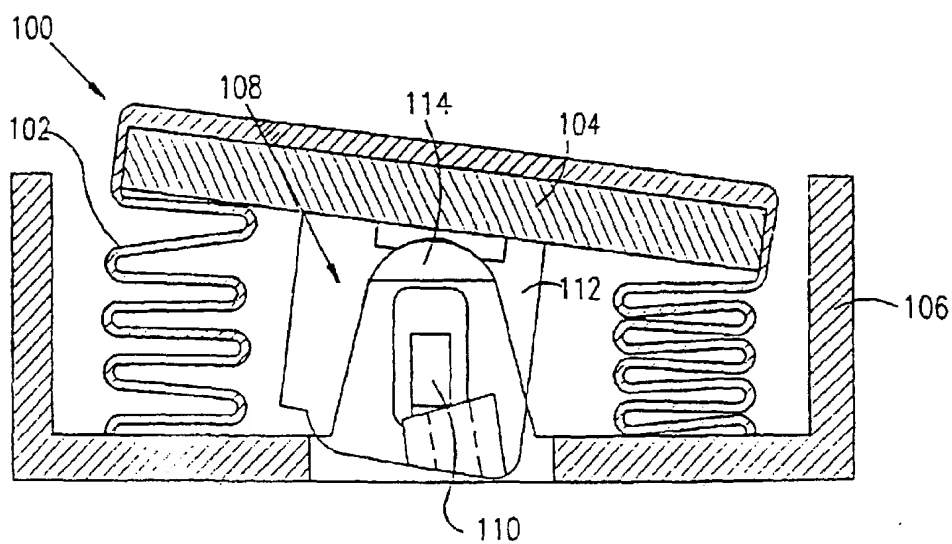


FIG. 9A

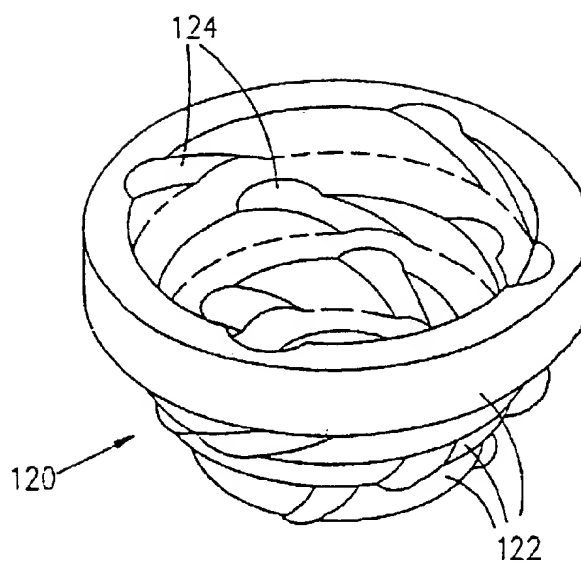
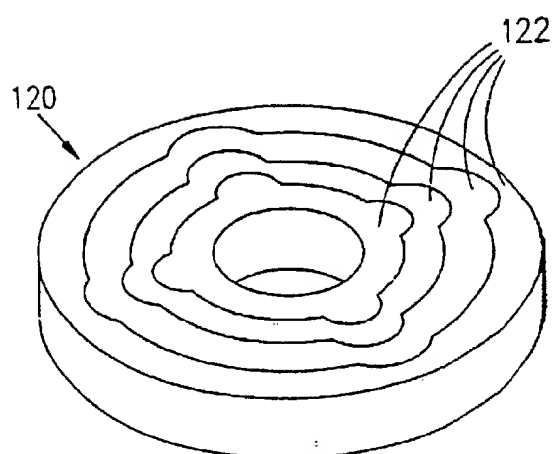


FIG. 9B



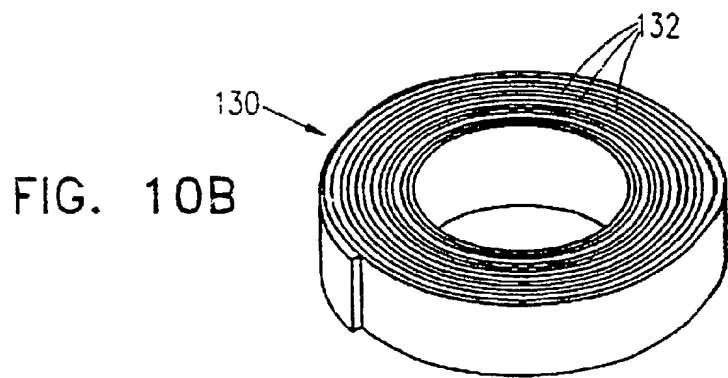
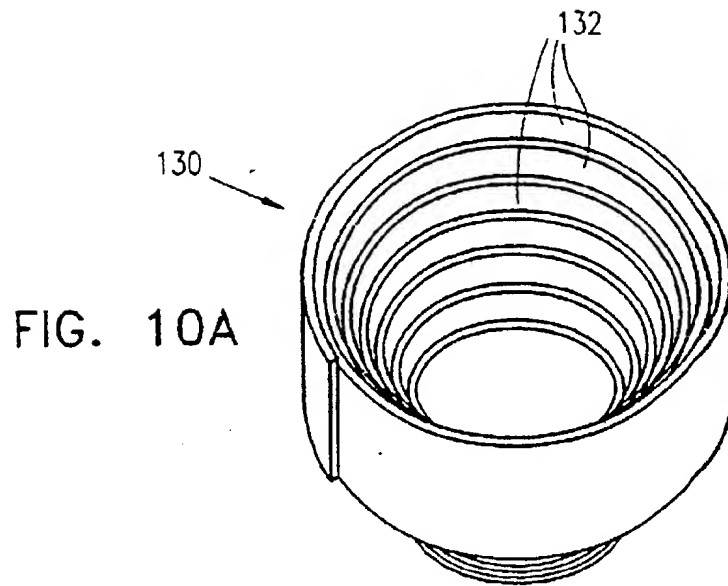


FIG. 11A

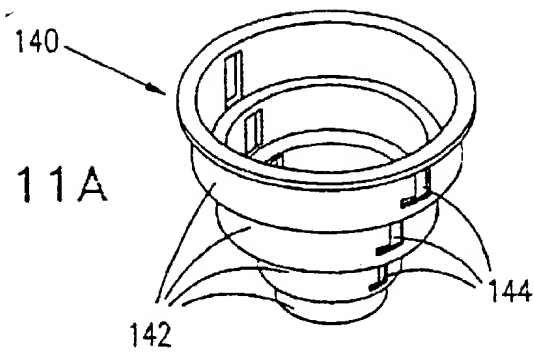
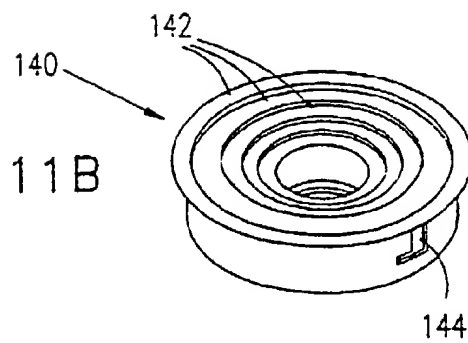
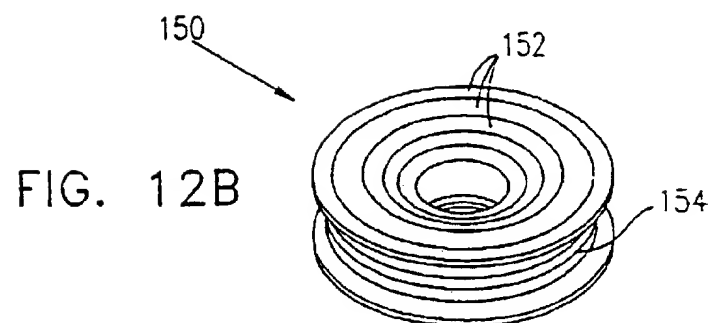
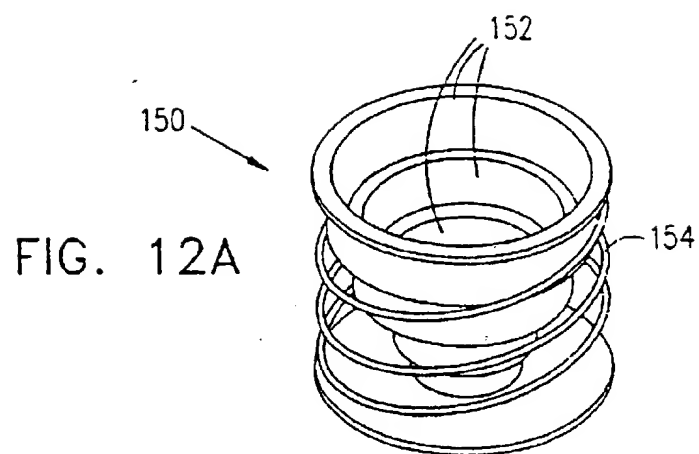


FIG. 11B





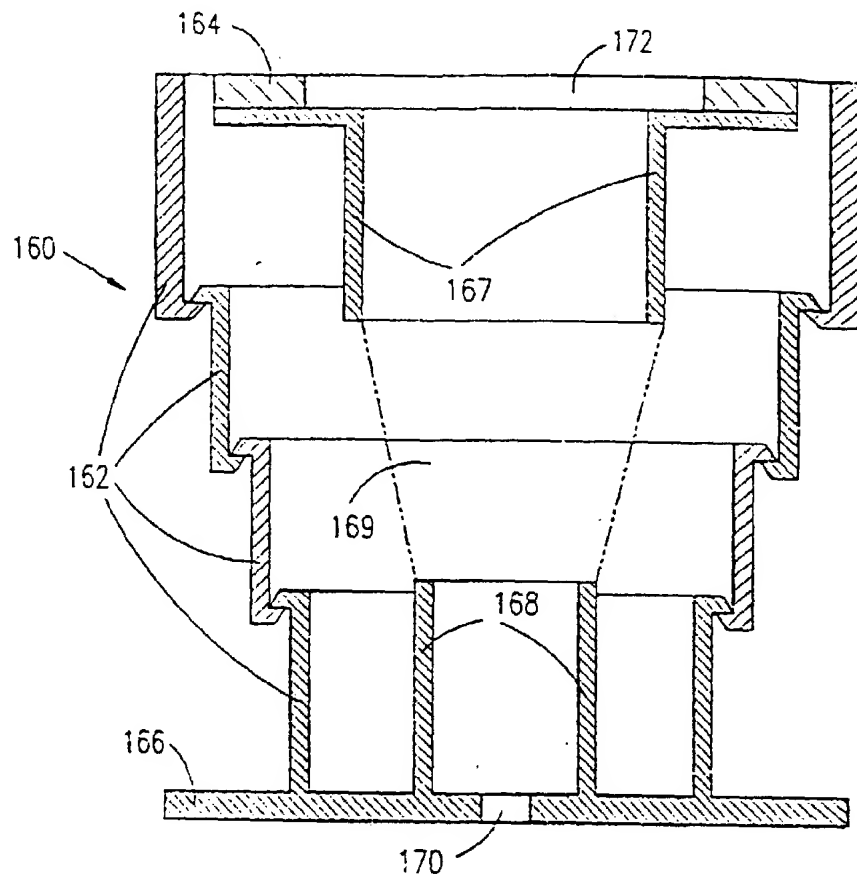
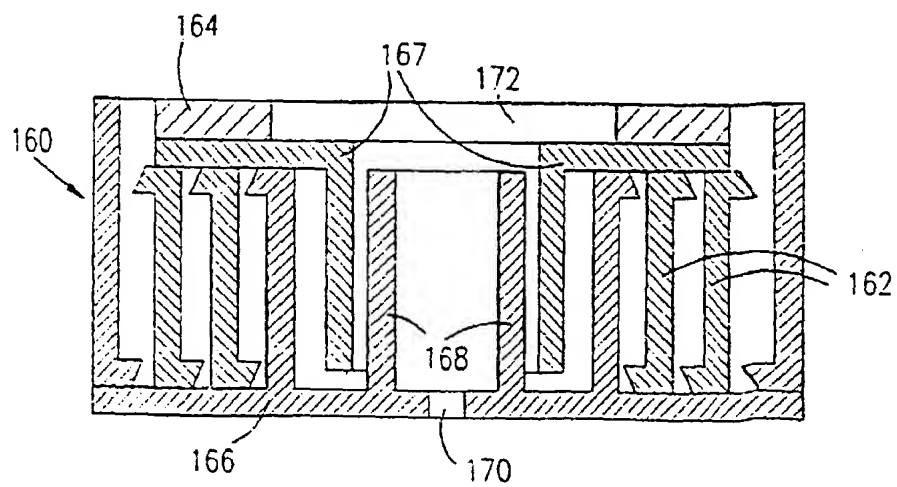


FIG. 13A

FIG. 13B



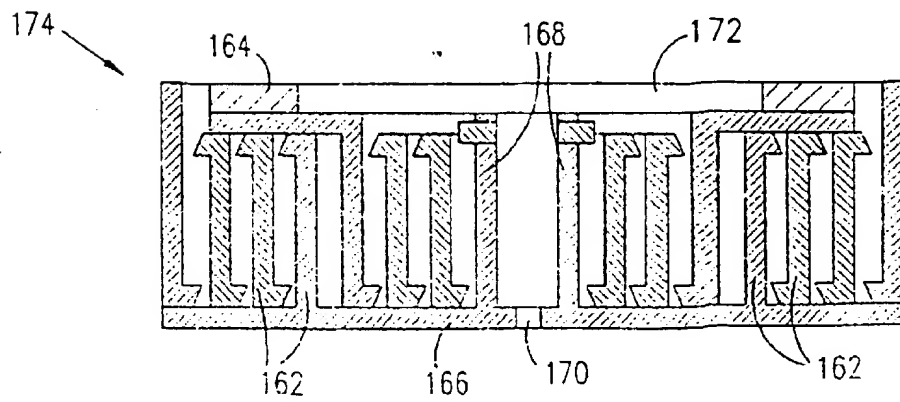
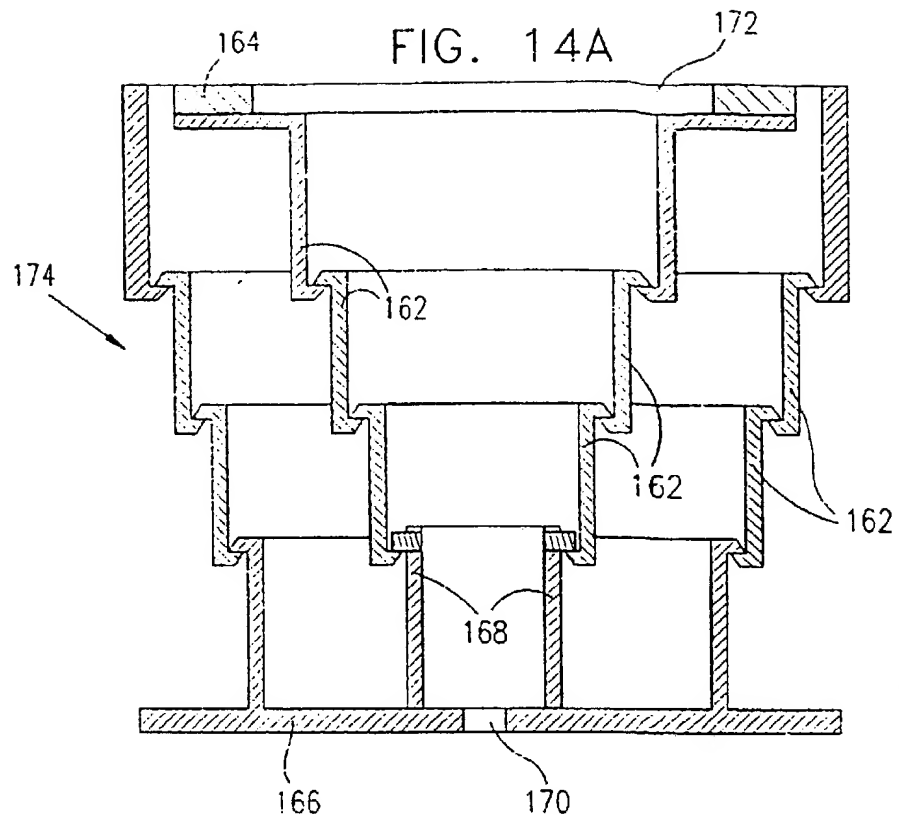


FIG. 14B

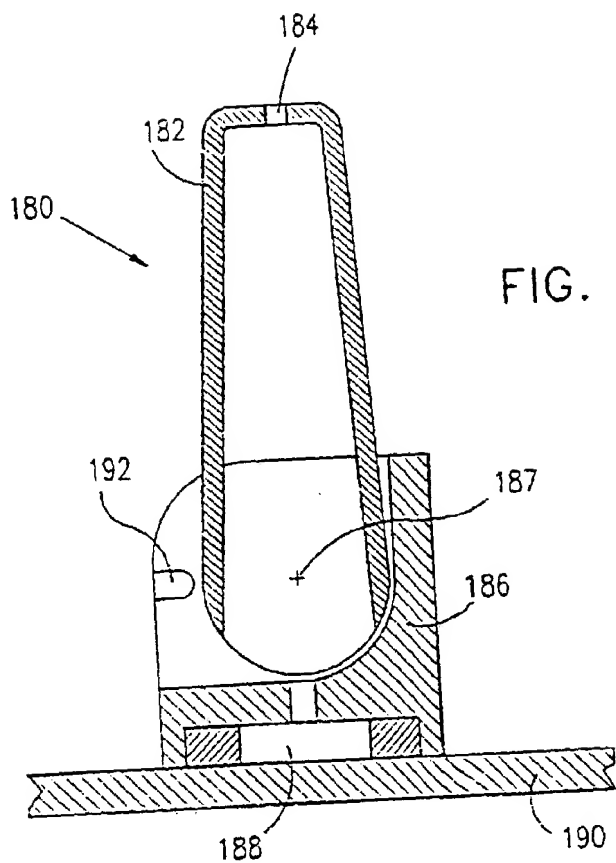


FIG. 15A

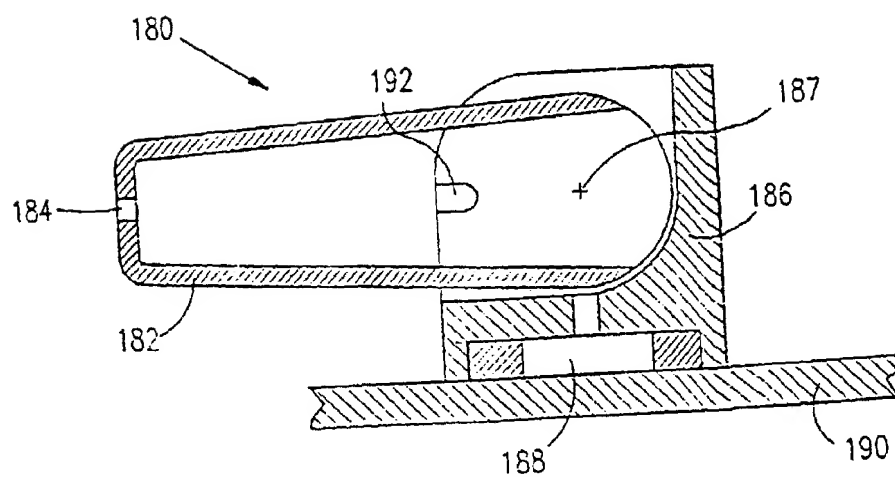


FIG. 15B

Improvements in the safety of
mobile radio communication equipment

The present invention relates to improvements in the
5 safety of mobile radio communication equipment such as
portable hand-held cellular telephones and accessories
therefor.

The use of portable hand-held cellular telephones has
spread throughout the world in recent years but a concern
10 has arisen regarding the safety of the users of such
telephones due to the radiation emitted thereby.

According to the present invention, however, a device
is provided for use with a cellular telephone of the kind
including a body, a telephone transmitter and receiver
15 disposed within the body, and a mouthpiece and earpiece
coupled to the transmitter and receiver, respectively, the
device comprising a collapsible sound conduit associated
with the earpiece, having a collapsed state when not in use
and an extended state when in use, for enabling an ear on
20 a head of a user to be spaced from the earpiece while
nevertheless maintaining an acceptable level of hearing,
such that the telephone is both spaced from the ear of the
user and angled with respect to the head of the user,
thereby to reduce an amount of radiation impinging on the
25 head of the user during use.

The device could be separate from the telephone and
also be separate from a carrying case for the telephone,
but alternatively the collapsible sound conduit could be

attached to either the telephone or the carrying case, for example by bonding thereto, or by at least one fastener provided on the device, or by being integrally formed therewith.

5 The device may be provided in combination with both the telephone and a carrying case for the telephone.

In a first embodiment, the collapsible sound conduit includes a plurality of telescoping sections. The telescoping sections may be threadable with each other.

10 Alternatively, or additionally, the telescoping sections may be a plurality of coils.

In a second embodiment, the collapsible sound conduit includes a resilient portion which is collapsible and foldable into itself. The collapsible sound conduit may
15 further include a plurality of stiffeners, and the stiffeners may include ribs which are arranged to define an acoustical path. The stiffeners may be adapted to limit collapsing of the collapsible sound conduit beyond a predetermined position.

20 In a third embodiment, the collapsible sound conduit includes a bellows. The bellows may have a surface which is tiltable about a pivot.

In a fourth embodiment, the collapsible sound conduit includes a conduit pivotable about a pivot such that, in
25 the collapsed state, the collapsible sound conduit is pivotable to be substantially parallel to the telephone and, in the extended state, the collapsible sound conduit

is pivotable to be substantially perpendicular to the telephone.

Further, the collapsible sound conduit may include a plurality of detents for fixing the collapsible sound
5 conduit in the collapsed and extended states.

It is to be understood that one or more of the features of any of the embodiments may also be provided in any of the other embodiments.

The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

Fig. 1 is a simplified, partially cutaway, pictorial illustration of a cellular telephone with a collapsible sound conduit in a collapsed, non-operational state, constructed and operative in accordance with a preferred embodiment of the present invention;

Fig. 2 is a simplified pictorial illustration of the cellular telephone of Fig. 1 with the collapsible sound conduit in an extended, operational state;

Fig. 3 is a simplified, exploded pictorial illustration of a cellular telephone and a collapsible sound conduit bondable thereto, constructed and operative in accordance with a preferred embodiment of the present invention;

Figs. 4A and 4B are simplified pictorial illustrations of a cellular telephone and a collapsible sound conduit fastenable thereto with straps, constructed and operative in accordance with another preferred embodiment of the present invention, respectively, before and after strapping the collapsible sound conduit to the telephone;

Fig. 5 is a simplified pictorial illustration of a cellular telephone with an integrally formed collapsible sound conduit, constructed and operative in accordance with a preferred embodiment of the present invention;

Fig. 6 is a simplified pictorial illustration of a cellular telephone and a collapsible sound conduit integrally

formed with a carry case of the telephone, constructed and operative in accordance with a preferred embodiment of the present invention;

Figs. 7A and 7B are simplified sectional illustrations of a resilient collapsible sound conduit, constructed and operative in accordance with a preferred embodiment of the present invention, in respective extended and collapsed states;

Figs. 8A, 8B and 8C are simplified sectional illustrations of a bellows type collapsible sound conduit, constructed and operative in accordance with a preferred embodiment of the present invention, in respective extended, collapsed and tilted states;

Figs. 9A and 9B are simplified pictorial illustrations of a collapsible sound conduit, constructed and operative in accordance with another preferred embodiment of the present invention, in respective extended and collapsed states;

Figs. 10A and 10B are simplified pictorial illustrations of a collapsible sound conduit, constructed and operative in accordance with yet another preferred embodiment of the present invention, in respective extended and collapsed states;

Figs. 11A and 11B are simplified pictorial illustrations of a collapsible sound conduit, constructed and operative in accordance with a further preferred embodiment of the present invention, in respective extended and collapsed states;

Figs. 12A and 12B are simplified pictorial

illustrations of a collapsible sound conduit, constructed and operative in accordance with still another preferred embodiment of the present invention, in respective extended and collapsed states;

Figs. 13A and 13B are simplified sectional illustrations of a collapsible sound conduit, constructed and operative in accordance with a further preferred embodiment of the present invention, in respective extended and collapsed states;

Figs. 14A and 14B are simplified sectional illustrations of a collapsible sound conduit, constructed and operative in accordance with yet a further preferred embodiment of the present invention, in respective extended and collapsed states; and

Figs. 15A and 15B are simplified sectional illustrations of a collapsible sound conduit which collapses by pivoting about a pivot, constructed and operative in accordance with another preferred embodiment of the present invention, in respective extended and collapsed states.

Reference is now made to Fig. 1 which illustrates a cellular telephone 10, constructed and operative in accordance with a preferred embodiment of the present invention.

Cellular telephone 10 preferably includes a body 12, a telephone transmitter 14 and receiver 16 disposed within body 12, and a mouthpiece 18 and an earpiece 20 coupled to transmitter 14 and receiver 16.

Cellular telephone 10 also includes a collapsible sound conduit 30 associated with earpiece 20. Collapsible sound conduit 30 may be integrally formed with body 12 of cellular telephone 10 (described hereinbelow with reference to Fig. 5), or alternatively may be manufactured as a separate unit attachable to telephone 10 (described hereinbelow with reference to Figs. 3, 4A and 4B). In another alternative embodiment, collapsible sound conduit 30 may be integrally formed with a carrying case (not shown in Fig. 1) used with telephone 10 (described hereinbelow with reference to Fig. 6).

Fig. 1 illustrates telephone 10 in a non-operative mode. It is seen that collapsible sound conduit 30 is preferably in a collapsed state when not in use.

Reference is now made to Fig. 2 which illustrates telephone 10 in an operative mode. It is seen that collapsible sound conduit 30 is preferably in an extended state when in use, which enables a user 32 to space earpiece 20 from his/her head while nevertheless maintaining an acceptable level of hearing. Telephone 10 is both spaced from an ear 34 of user 32 by a distance 36 and angled with respect to the head of user 32 by an

angle 38, thereby reducing the amount of radiation impinging on the head of user 32 during use.

Reference is now made to Fig. 3 which illustrates a cellular telephone 40 and a collapsible sound conduit 42 bondable thereto, constructed and operative in accordance with a preferred embodiment of the present invention. Collapsible sound conduit 42 may be bonded to an earpiece 44 of telephone 40 by bonding with an adhesive. Alternatively, collapsible sound conduit 42 may be provided with an adhesive pad 46 for bonding to earpiece 44.

Reference is now Fig. 4A which illustrates a cellular telephone 50 and a collapsible sound conduit 52 fastenable thereto with straps 54, constructed and operative in accordance with another preferred embodiment of the present invention. Straps may be provided with a multiple hook and loop fastener 56, as shown in Fig. 4A, although any other conventional fastener may be used, such as a buckle or hook. Fig. 4B shows collapsible sound conduit 52 strapped to telephone 50.

Reference is now made to Fig. 5 which illustrates a cellular telephone 60 with an integrally formed collapsible sound conduit 62, constructed and operative in accordance with a preferred embodiment of the present invention. Collapsible sound conduit 62 may be injection molded together with telephone 60 or may be manufactured separately and attached to telephone 60 by a manufacturer.

Reference is now made to Fig. 6 which illustrates a cellular telephone 70 which includes a carrying case 71, constructed and operative in accordance with a preferred

embodiment of the present invention. A collapsible sound conduit 72 is attached to carrying case 71. Collapsible sound conduit 72 may be integrally formed with carrying case 71 or it may alternatively be manufactured separately for later attachment thereto, such as by bonding, either by a manufacturer or a user.

The collapsible sound conduits of the present invention may collapse and expand in a variety of manners which are described with reference to Figs. 7A - 15B.

Reference is now made to Figs. 7A and 7B which illustrate a collapsible sound conduit 80, constructed and operative in accordance with a preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 80 preferably includes a resilient portion 82 which, as seen particularly in Fig. 7B, is collapsible and foldable into itself. Resilient portion 82 may be made of any elastomeric material, such as rubber or neoprene, for example, with a suitable durometer so that collapsible sound conduit 80 has sufficient stiffness or hardness when fully extended. Stiffeners or a stiffening material (not shown) may be integrally molded in the elastomeric material of resilient portion 82 to achieve the required stiffness or hardness. Resilient portion 82 may include recesses 84 that increase the foldability of collapsible sound conduit 80.

Collapsible sound conduit 80 may include a plurality of stiffeners 86 protruding from a user listening portion 88 and/or a plurality of stiffeners 90 protruding from a telephone attachment portion 92. Stiffeners 86 and 90 are preferably shaped as ribs which either protrude perpendicularly or at any other

suitable angle. Stiffeners 86 and 90 preferably define an acoustical path 94 from an aperture 96 formed on telephone attachment portion 92 to an aperture 98 formed on user listening portion 88. Stiffeners 86 and 90 are adapted to limit collapsing of collapsible sound conduit 80.

Telephone attachment portion 92 may comprise a bonding pad 99 for attachment to a telephone.

Reference is now made to Figs. 8A, 8B and 8C which illustrate a bellows type collapsible sound conduit 100, constructed and operative in accordance with a preferred embodiment of the present invention. Collapsible sound conduit 100 preferably includes a bellows 102 made of a resilient material, a user listening portion 104 and a telephone attachment portion 106. Collapsible sound conduit 100 also preferably includes a clasp 108 which includes a male fastener 110 and a female fastener 112. Male fastener 110 preferably includes a rounded pivot 114.

In Fig. 8A, collapsible sound conduit 100 is fully extended. In Fig. 8B, it is collapsed. In Fig. 8C, it is seen that user listening portion 104 may pivot about pivot 114, thereby possibly conforming with the motions of a user or the contour of his/her face.

In accordance with another preferred embodiment of the present invention, the collapsible sound conduit may collapse by means of telescoping sections. Examples of such embodiments are describe with reference to Figs. 9A - 14B.

Reference is now made to Figs. 9A and 9B which

illustrate a collapsible sound conduit 120, constructed and operative in accordance with another preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 120 includes a plurality of telescoping sections 122 which are threadable with each other by means of threads 124 (Fig. 9A).

Reference is now made to Figs. 10A and 10B which illustrate a collapsible sound conduit 130, constructed and operative in accordance with yet another preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 130 preferably includes a plurality of telescoping sections 132 which comprise a plurality of coils.

Reference is now made to Figs. 11A and 11B which illustrate a collapsible sound conduit 140, constructed and operative in accordance with a further preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 140 preferably includes a plurality of telescoping sections 142 which comprise a plurality of coils. Telescoping sections 142 are preferably provided with a plurality of detents 144 for fixing sections 142 in an extended position.

Reference is now made to Figs. 12A and 12B which illustrate a collapsible sound conduit 150, constructed and operative in accordance with still another preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 150 preferably includes a plurality of telescoping sections 152 and a biasing device, such

as a spring 154 for providing tension in the extended state. A catch (not shown) may be provided for holding spring 154 in the collapsed state.

Reference is now made to Figs. 13A and 13B which illustrate a collapsible sound conduit 160, constructed and operative in accordance with a further preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 160 preferably includes a plurality of telescoping sections 162 interconnected to each other, a user listening portion 164 and a telephone attachment portion 166.

Collapsible sound conduit 160 may include a plurality of stiffeners 167 protruding from user listening portion 164 and/or a plurality of stiffeners 168 protruding from telephone attachment portion 166. Stiffeners 167 and 168 are preferably shaped as ribs which either protrude perpendicularly or at any other suitable angle. Stiffeners 167 and 168 preferably define an acoustical path 169 from an aperture 170 formed on telephone attachment portion 166 to an aperture 172 formed on user listening portion 164. Stiffeners 167 and 168 are adapted to limit collapsing of collapsible sound conduit 160.

Reference is now made to Figs. 14A and 14B which illustrate a collapsible sound conduit 174, constructed and operative in accordance with a further preferred embodiment of the present invention. Collapsible sound conduit 174 is substantially identical to collapsible sound conduit 160, with like elements being designated by like numerals. Collapsible

sound conduit 174, unlike collapsible sound conduit 160, is provided with one or more additional sets of telescoping sections 162, and stiffener 167 has been eliminated.

Reference is now made to Figs. 15A and 15B which illustrate a collapsible sound conduit 180, constructed and operative in accordance with another preferred embodiment of the present invention, in respective extended and collapsed states. Collapsible sound conduit 180 preferably includes a user listening portion 182 with an aperture 184 formed thereon. User listening portion 182 is preferably pivotally attached to a telephone attachment portion 186 at a pivot 187. Telephone attachment portion 186 preferably has an aperture 188 formed thereon. A bonding pad 190 may be attached to telephone attachment portion 186 for bonding collapsible sound conduit 180 to a cellular telephone (not shown).

In the extended state shown in Fig. 15A, collapsible sound conduit 180 is pivotable to be substantially perpendicular to a telephone (not shown). In the collapsed state shown in Fig. 15B, collapsible sound conduit 180 is pivotable to be substantially parallel with the telephone. One or more detents 192 may be provided for fixing user listening portion 182 in the collapsed and/or extended states.

CLAIMS

1. A device, for use with a cellular telephone of the kind including a body, a telephone transmitter and receiver
5 disposed within the body, and a mouthpiece and earpiece coupled to the transmitter and receiver, respectively, the device comprising a collapsible sound conduit associated with the earpiece, having a collapsed state when not in use and an extended state when in use, for enabling an ear on
10 a head of a user to be spaced from the earpiece while nevertheless maintaining an acceptable level of hearing, such that the telephone is both spaced from the ear of the user and angled with respect to the head of the user, thereby to reduce an amount of radiation impinging on the
15 head of the user during use.
2. A device according to claim 1, wherein said collapsible sound conduit is attached to the telephone.
3. A device according to claim 1, wherein said collapsible sound conduit is attached to a carrying case
20 for the telephone.
4. A device according to claim 2 or claim 3, wherein said collapsible sound conduit is attached to the telephone or the carrying case by bonding thereto.
5. A device according to claim 2 or claim 3, wherein said
25 collapsible sound conduit is attached to the telephone or the carrying case by at least one fastener provided on said device.

6. A device according to claim 2 or claim 3, wherein said collapsible sound conduit is attached to the telephone or the carrying case by being integrally formed therewith.
7. A device according to any preceding claim, wherein
5 said device is provided in combination with both the telephone and a carrying case for the telephone.
8. A device according to any one of claims 1 to 7, wherein said collapsible sound conduit comprises a plurality of telescoping sections.
- 10 9. A device according to claim 8, wherein said telescoping sections are threadable with each other.
10. A device according to claim 8 or claim 9, wherein said telescoping sections are a plurality of coils.
11. A device according to any one of claims 1 to 7,
15 wherein said collapsible sound conduit comprises a resilient portion which is collapsible and foldable into itself.
12. A device according to claim 11, wherein said collapsible sound conduit further comprises a plurality of
20 stiffeners.
13. A device according to claim 12, wherein said stiffeners comprise ribs which are arranged to define an acoustical path.
14. A device according to claim 12 or claim 13, wherein
25 said stiffeners are adapted to limit collapsing of said collapsible sound conduit beyond a predetermined position.
15. A device according to any one of claims 1 to 7, wherein said collapsible sound conduit comprises a bellows.

16. A device according to claim 15, wherein said bellows has a surface which is tiltable about a pivot.
17. A device according to any one of claims 1 to 7, wherein said collapsible sound conduit comprises a conduit
5 pivotable about a pivot such that, in said collapsed state, said collapsible sound conduit is pivotable to be substantially parallel to the telephone and, in said extended state, said collapsible sound conduit is pivotable to be substantially perpendicular to the telephone.
- 10 18. A device according to claim 17, wherein said collapsible sound conduit further comprises a plurality of detents for fixing said collapsible sound conduit in said collapsed and extended states.
- 15 19. A device substantially as hereinbefore described with reference to any of the accompanying drawings.



Application No: GB 9701670.3
Claims searched: 1-19

Examiner: Anita Keogh
Date of search: 11 April 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4J (JEP, JK, JL)

Int Cl (Ed.6): H04M (1/02, 1/03, 1/05, 1/19) H04B (1/38)

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2280322 A (NEC) see particularly Figures 1 and 5	
X	GB 2264207 A (NOKIA) see particularly page 2 line 31 to page 3 line 20 and Figures 2-5	1, 2, 6, 11
X	GB 0782966 A (PAPALIA) see figure and particularly column 1 line 30 to column 2 line 57, and column 3, lines 36-43	1, 2, 4, 6, 11, 15
A	EP 0663734 A1 (SIEMENS) see abstract and figures	
X	US 5034979 (ERICKSON) see in particular, abstract, figures and column 1 lines 54-60	1, 2, 4, 5, 17

17

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.